REFERENCE MATERIALS SUMMARY—ADDRESSING NUTRIENT POLLUTION IN NPDES PERMITS

FOLDERS		
Title	**Author**	**Summary**
Ecoregional Nutrient Criteria Documents for Lakes & Reservoirs	U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology – Health and Ecological Criteria Division	These documents present EPA's nutrient criteria for Lakes and Reservoirs in Ecoregions across the country. They contain EPA's recommendations to states and authorized tribes for establishing their water quality standards. These recommended criteria are not laws or regulations - they are guidance that states and tribes may use as a starting point for the criteria for their water quality standards. - Ecoregion II: Western Forested Mountains - Ecoregion III: Xeric West - Ecoregion IV: Great Plains Grass and Shrublands - Ecoregion V: South Central Cultivated Great Plains - Ecoregion VI: Corn Belt and Northern Great Plains - Ecoregion VII: Mostly Glaciated Dairy Region - Ecoregion VIII: Nutrient Poor Largely Glaciated Upper Midwest and Northeast - Ecoregion IX: Southeastern Temperate Forested Plains and Hills - Ecoregion XI: The Central and Eastern Forested Uplands - Ecoregion XII: Southeastern Coastal Plain - Ecoregion XIII: Southern Florida Coastal Plain - Ecoregion XIV: Eastern Coastal Plain

FOLDERS		
Title	**Author**	**Summary**
Ecoregional Nutrient Criteria Documents for Rivers & Streams	U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology – Health and Ecological Criteria Division	These documents present EPA's nutrient criteria for Rivers and Streams in Ecoregions across the country. They contain EPA's recommendations to states and authorized tribes for establishing their water quality standards. These recommended criteria are not laws or regulations - they are guidance that states and tribes may use as a starting point for the criteria for their water quality standards. - Ecoregion I: Willamette and Central Valleys - Ecoregion II: Western Forested Mountains - Ecoregion III: Xeric West - Ecoregion IV: Great Plains Grass and Shrublands - Ecoregion V: South Central Cultivated Great Plains - Ecoregion VI: Corn Belt and Northern Great Plains - Ecoregion VII: Mostly Glaciated Dairy Region - Ecoregion VIII: Nutrient Poor Largely Glaciated Upper Midwest and Northeast - Ecoregion IX: Southeastern Temperate Forested Plains and Hills - Ecoregion X: Texas-Louisiana Coastal and Mississippi Alluvial Plains - Ecoregion XI: The Central and Eastern Forested Uplands - Ecoregion XII: Southeastern Coastal Plain - Ecoregion XIV: Eastern Coastal Plain
Ecoregional Nutrient Criteria Documents for Wetlands	U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology – Health and Ecological Criteria Division	This EPA document presents current recommended criteria for total phosphorus for wetlands in Nutrient Ecoregion XIII - Southern Florida Coastal Plain which were derived using peer-reviewed publications of research conducted in the Everglades and the findings and information associated with the EPA approval of the Miccosukee Tribe of Indians of Florida standard for phosphorus for the Federal Reservation within the Everglades.

INDIVIDUAL DOCUMENTS

Title	Author	Summary
Advanced Wastewater Treatment to Achieve Low Concentration of Phosphorus	U.S. Environmental Protection Agency, Region 10, Office of Water and Watersheds	This EPA Region 10 report presents observations of advanced wastewater treatment installed at 23 municipalities in the United States employing chemical addition and a range of filtration technologies that have proven very effective at producing an effluent containing low levels of phosphorus.
Annual Permit Limits for Nitrogen and Phosphorus for Permits Designed to Protect Chesapeake Bay and its Tidal Tributaries from Excess Nutrient Loading Under the National Pollutant Discharge Elimination System	James A. Hanlon, Director, Office of Wastewater Management	This memorandum responds to a proposal to use NPDES permit effluent limits for nitrogen and phosphorus expressed as an annual limit in lieu of daily maximum, weekly average, or monthly average effluent limitations, for the protection of Chesapeake Bay and its tidal tributaries from excess nutrient loading. The memorandum describes the scientific and policy rationale that supports this approach.
Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants: Draft—Version 1.0	U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, Office of Science and Technology, Office of Wastewater Management	This August 2015 technical report supplements a number of recent guidance manuals and reports published by EPA on nutrient removal at wastewater treatment plants (WWTPs) by providing useful information to managers and operators of plants that may not be specifically designed for nutrient removal or for those seeking to achieve even better treatment through relatively low-cost modifications. It is intended to help fill gaps in published information about improving nutrient reduction performance at existing WWTPs (generally activated sludge facilities with basic treatment processes), using relatively low-cost techniques.
Central Tenets of the NPDES Permitting Program	U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division	This NPDES program document intended to provide permit writers with a summary of core permitting principles including: permit administration, technology-based effluent limits, water quality-based effluent limits, monitoring and reporting conditions, special conditions, and standard conditions.
Clean Water Act	U.S. Senate	These 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act or CWA) provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically requires EPA to develop and implement the NPDES program. The CWA provides the authority and requirements for EPA to set technology-based effluent limits by facility category and water quality-based limits that ensure protection of the receiving water.

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Title	Author	Summary
Clean Water Rule: Definition of ''Waters of the United States''; Final Rule	U.S. Environmental Protection Agency and U.S. Army Corps of Engineers	This final rule was published on June 29, 2015, by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. It defines the scope of waters protected under the Clean Water Act in light of the statute, science, Supreme Court decisions in *U.S. v. Riverside Bayview Homes*, *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, and *Rapanos v. United States*, and the agencies' experience and technical expertise.
Compilation of EPA Mixing Zone Documents	U.S. Environmental Protection Agency, Office of Water	This compilation presents a number of regulatory, guidance, and policy documents available from EPA on mixing zones and provides information and links to state and EPA regional information on this subject. The purpose of the document is to serve as a source of information for states, authorized tribes, and territories to use when developing and refining their mixing zone policies and to assist NPDES permit writers when implementing mixing zones.
Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits	James A. Hanlon, Director, Office of Wastewater Management	This memorandum answers the questions of when a permitting authority may include a compliance schedule in a permit for the purpose of achieving a water quality-based effluent limitation and what principles are applicable to assessing whether a compliance schedule for achieving a water quality-based effluent limitation is consistent with the CWA and its implementing regulations.
Developing Credible Rationales for Variances that Apply to Multiple Dischargers	U.S. Environmental Protection Agency, Office of Water	These FAQs address questions that may arise when states and tribes seek to streamline the adoption and approval of water quality standards variances for pollutants that have an impact on multiple permittees. The FAQs are designed to help states and tribes evaluate the appropriateness of using a multiple discharger variance approach.
Guiding Principles on an Optional Approach for Developing and Implementing Integrated Nutrient Criteria	U.S. Environmental Protection Agency, Office of Water	This EPA document offers guiding principles to clarify to states about an optional approach for developing a numeric nutrient criterion that integrates causal and response parameters into a single water quality standard.
Interim Economic Guidance for Water Quality Standards—Workbook	U.S. Environmental Protection Agency, Office of Water	This guidance is for use by states and EPA regional offices in considering economics at various points in the process of setting or revising water quality standards.

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Title	Author	Summary
Interim Economic Guidance for Water Quality Standards—Worksheets	U.S. Environmental Protection Agency, Office of Water	This document bundles together the worksheets from the *Interim Economic Guidance for Water Quality Standards—Workbook*.
Municipal Nutrient Removal Technologies Reference Document, Volume 1 – Technical Support	U.S. Environmental Protection Agency, Office of Wastewater Management, Municipal Support Division	This EPA reference manual helps municipal utility owners and operators, state permit writers and regulators plan cost-effective nutrient removal projects for municipal wastewater treatment facilities. It provides detailed technical and cost information about both biological and physiochemical treatment technologies. It includes detailed process descriptions and operating factors for processes that can remove nitrogen, phosphorus, or both from municipal wastewater. It also includes data on process performance and reliability.
Municipal Nutrient Removal Technologies Reference Document, Volume 2 – Appendices	U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, Watersheds Branch	This EPA reference manual helps municipal utility owners and operators, state permit writers and regulators plan cost-effective nutrient removal projects for municipal wastewater treatment facilities. It includes nine in-depth facility studies that examine the factors involved in successful process design and operation, and cost analysis.
Nitrogen and Phosphorus Pollution Data Access Tool (NPDAT) Fact Sheet	U.S. Environmental Protection Agency, Office of Wastewater Management, Municipal Support Division	This EPA fact sheet summarizes the "Nitrogen and Phosphorus Pollution Data Access Tool" (NPDAT), which helps states, other EPA partners, and stakeholders to set watershed priorities statewide for nitrogen and phosphorus loading reductions and set watershed load reduction goals based upon best available information. The NPDAT consists of an introductory Website, geospatial viewer, data downloads, and datasets available publicly elsewhere.
NPDES Permit Writers' Manual	U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division.	This EPA manual reviews the statutory and regulatory framework of the NPDES program and examines technical considerations for developing NPDES permits for wastewater discharges. The manual is designed, primarily, for new permit writers becoming acquainted with the NPDES program and the process of permit writing, but can also serve as a reference for experienced permit writers or anyone interested in learning about the legal and technical aspects of developing NPDES permits.

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Title	Author	Summary
Nutrient Control Design Manual	U.S. Environmental Protection Agency, Office of Research and Development, National Risk Management Research Laboratory – Water Supply and Water Resources Division	This EPA design manual provides updated, state-of-the-technology design guidance on nitrogen and phosphorus control at municipal wastewater treatment plants (WWTPs) and extensive information on the principles of biological nutrient removal and chemical phosphorus removal to serve as the basis for design. Because most WWTPs in the United States are equipped with secondary treatment, the focus of this design manual is on retrofits to add nutrient removal to existing WWTPs rather than on new treatment plant design and includes information about greenfield design.
Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters	U.S. Environmental Protection Agency, Office of Water	This EPA manual is intended for state, tribal, and federal agency personnel actively engaged in water resource management data collection, assessment, planning, and project implementation and incorporates both a scientific rationale and enough of the "nuts and bolts" of nutrient criteria development and management to help both initiates and those experienced in water resource management.
Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs	U.S. Environmental Protection Agency, Office of Water and Office of Science and Technology	This EPA manual provides state and tribal water quality managers with guidance on how they can set nutrient criteria at the state, regional, or individual water body level, describing methods for classifying water bodies and developing appropriate values for these criteria. The document also provides information on sampling, data processing, and appropriate management techniques.
Nutrient Criteria Technical Guidance Manual: Rivers and Streams	U.S. Environmental Protection Agency, Office of Water and Office of Science and Technology	This EPA manual provides scientifically defensible technical guidance to assist states and tribes in developing regionally-based numeric nutrient and algal criteria for river and stream systems.
Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria	U.S. Environmental Protection Agency, Office of Water	This EPA fact sheet describes the scientific basis supporting the development of criteria for both nitrogen and phosphorus. It does not address the flexibility that states and authorized tribes have to set priorities for the development of criteria based on nutrient management strategies.

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Title	Author	Summary
Protection of Downstream Waters in Water Quality Standards: Frequently Asked Questions	U.S. Environmental Protection Agency, Office of Water	These frequently asked questions address the importance of having upstream designated uses and criteria that ensure the attainment and maintenance of downstream water quality standards; considerations regarding downstream protection when developing upstream water quality standards; and approaches, tools, and flexibilities available for assuring attainment and maintenance of downstream water quality standards
Protocol for Developing Nutrient TMDLs: First Edition	U.S. Environmental Protection Agency, Office of Water	This Total Maximum Daily Load (TMDL) protocol is intended to provide users with an organizational framework for the TMDL development process for nutrients. The process presented will assist with the development of rational, science-based assessments and decisions and ideally will lead to the assemblage of an understandable and justifiable TMDL.
Quality Criteria for Water, 1986 [Gold Book], Total Phosphorus Discussion	U.S. Environmental Protection Agency, Office of Water Regulations and Standards	This document provides total phosphorus recommendations. Although a total phosphorus criterion to control nuisance aquatic growths is not included, the discussion presents and encourages consideration of a rationale to support a criterion.
Statewide Nutrient Removal Cost Impact Study: Final Report	Utah Division of Water Quality	This document presents the result of a statewide study conducted to evaluate the economic impacts of potential nutrient removal requirements for Utah's POTWs. The study estimated economic, financial, and environmental impacts associated with a range of potential nutrient discharge standards for all discharging POTWs in Utah. The report provides summaries of the analyses conducted for each of the POTWs evaluated in the study.
Summary Table for the Nutrient Criteria Documents	U.S. Environmental Protection Agency	These tables present the recommended EPA criteria for each of the aggregate nutrient ecoregions for the following parameters: Total Phosphorus, Total Nitrogen, Chlorophyll a, and Turbidity or Secchi. Criteria are presented for both Lakes & Reservoirs and Rivers & Streams.

INDIVIDUAL DOCUMENTS

Title	Author	Summary
Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities	Washington Department of Ecology	This report presents an evaluation of two approaches to reducing nutrient loadings from WWTPs: improving treatment processes to remove more nitrogen or phosphorus, thereby reducing their concentrations in treatment plant effluent, or improving treatment processes to achieve effluent quality suitable for use as reclaimed water to recharge groundwater sources rather than being discharged to surface waters. The report presents a preliminary assessment of the effectiveness and cost of various technology upgrades modeled for numerous types of treatment plants used in Washington State.
Technical Support Document for Water Quality-Based Toxics Control	U.S. Environmental Protection Agency, Office of Water	This EPA technical document provides states and Regions with guidance on procedures for use in determining the need for and calculating water quality-based effluent limitations for control of toxic pollutants.
Upper Blackstone Water Pollution Abatement District, NPDES Permit No. MA0102369, NPDES Appeal Nos. 08-11 to 08-18 & 09-06, Order Denying Review in Part and Remanding in Part.	U.S. Environmental Protection Agency, Environmental Appeals Board, Washington, DC	This document summarizes the decisions made by the Environmental Appeals Board regarding appeals made against the Upper Blackstone Water Pollution Abatement District. The Board denied review in all respects except one; the Board remands the Permit's provisions adding, as co-permittees subject to the Permit's conditions, certain municipalities served by the District's Treatment Plant.
Using Stressor-response Relationships to Derive Numeric Nutrient Criteria	U.S. Environmental Protection Agency, Office of Water	This document elaborates on stressor-response analysis by providing a four-step process for estimating and interpreting stressor-response relationships for deriving numeric criteria to address nitrogen/phosphorus pollution.
Water Quality Standards Regulatory Revisions; Final Rule	U.S. Environmental Protection Agency	This final rule was published on August 21, 2015, by the U.S. Environmental Protection Agency. The rule addresses the following key water quality standards (WQS) program areas: (1) Administrator's determination that new or revised WQS for states and tribes are necessary, (2) designated uses of waters, (3) triennial reviews of state and authorized tribal WQS, (4) antidegradation provisions to protect water quality, (5) WQS variances, and (6) permit compliance schedule authorizing provisions.
Water Quality Standards Regulatory Revisions (Final Rule)—Fact Sheet	U.S. Environmental Protection Agency, Office of Water	This fact sheet summarizes EPAs rule updating the federal water quality standards (WQS) regulation at 40 CFR Part 131.

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Water Quality Trading Toolkit for Permit Writers	U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division	This guidance document is EPA's first "how-to" manual on designing and implementing water quality trading programs. The Toolkit helps NPDES permitting authorities incorporate trading provisions into permits and its use will improve the quality and consistency of all trading programs across the nation.
Watershed-based National Pollutant Discharge Elimination System (NPDES) Permitting Implementation Guidance	U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division	This document describes EPA's recommended steps and ideas for watershed-based permitting implementation under the NPDES permit program. This approach, aimed at achieving new efficiencies and environmental results, provides a process for considering all stressors within a hydrologically defined drainage basin or other geographic area, rather than addressing individual pollutant sources on a discharge-by-discharge basis.
Watershed-based National Pollutant Discharge Elimination System (NPDES) Permitting Technical Guidance	U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division	This EPA technical guidance is a follow up to the 2003 *Watershed-based National Pollutant Discharge Elimination System (NPDES) Permitting Implementation Guidance* and provides greater detail concerning a number of permit development and issuance questions not addressed previously. This document is focused on helping NPDES authorities develop and issue NPDES permits that fit into an overall watershed planning and management approach with input from watershed stakeholders.

WEB SITES		
Title	**Author**	**Summary**
Modeling Guidance for Developing Site-Specific Nutrient Goals (including Nutrient Modeling Toolbox).	Water Environment Research Foundation (WERF)	This report presents guidance and tools for using models to set water body-specific nutrient goals, including numeric nutrient criteria and allowable nutrient loadings. The Nutrient Modeling Toolbox contains 30 models capable of quantifying the relationship between nutrient loads and their impacts on water quality or ecological response indicators. A Model Selection Decision Tool (MSDT) guides users in selecting potential models for their specific site, condition, response indicator(s), and available data and resources. Six case studies demonstrate application of the modeling concepts. http://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=LINK1T11
Water Environment Research Foundation (WERF) Nutrients Research	Water Environment Research Foundation (WERF)	This chart lists completed reports (with links for downloading) and ongoing nutrient research efforts by the Water Environment Research Foundation (WERF). https://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=NUTR1R06r
Web-based Water Quality Trading Training	U.S. Environmental Protection Agency, Office of Water	These recorded Web-based presentations cover the material presented in a one-day water quality trading training workshop developed by EPA. The recorded presentations enable participants to review the material on demand in a self-paced environment to become familiar with key water quality trading concepts. http://water.epa.gov/polwaste/npdes/Web-based-Water-Quality-Trading-Training.cfm *(Note: USEPA is updating its web site. Some URLs will change as a result of this update).*